

WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR INSTRUMENTS AND METHODS OF OBSERVATION

JOINT

**CIMO EXPERT TEAM ON
SURFACE-BASED INSTRUMENT INTERCOMPARISONS
AND CALIBRATION METHODS**
Fourth (reduced) Session

AND

**INTERNATIONAL ORGANIZING COMMITTEE ON
SURFACE-BASED INSTRUMENT INTERCOMPARISONS**
Fourth (reduced) Session

**Ghardaïa, Algeria
19 - 23 March 2007**

FINAL REPORT



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EXECUTIVE SUMMARY

This report provides a summary of the fourth (reduced) session of the Joint Expert Team on Surface-Based Instrument Intercomparisons and Calibration Methods (ET) and International Organizing Committee on Surface-Based Instrument Intercomparisons (IOC). The ET/IOC inspected the intercomparison site of the WMO Field Intercomparison of the thermometer screens/shields in conjunction with the humidity measuring instruments in Ghardaïa, made suggestions to improve further its functionality and possible expansion of the site and selected additional instruments for the intercomparison. It checked the procedures and preliminary results of the laboratory calibration phase, procedures for the field installation, including the supervision and maintenance of instruments during the intercomparison period. The ET/IOC also agreed on the data acquisition and archiving, data processing, data policy and analysis methodology. It also updated the schedule of the intercomparison and agreed on the updated list of the participating instruments and instruction for their transportation to Ghardaïa.

GENERAL SUMMARY

1. ORGANIZATION OF THE SESSION

1.1 Opening of the session

1.1.1 The fourth (reduced) session of the Joint Meeting of the Expert Team on Surface-Based Instrument Intercomparisons and Calibration Methods (ET) and International Organizing Committee on Surface-Based Instrument Intercomparisons (IOC) was held at the Meteorological station Ghardaïa of the National Meteorological Service of Algeria from 19 to 23 March 2007. Mr Michel Leroy, the chairman of the ET/IOC, opened the session. Mr Naili, Director of the Algerian National Centre of Installations and Maintenance, welcomed the participants. The list of participants is given in Annex I.

1.1.2 The official opening was held on 21 March 2007 during the ceremony held by the local state authority at the occasion of the World Meteorological Day (WMD). The ET/IOC participated at the WMD exposition and made presentations on the Global Observing System of WMO and on the status of the WMO Field Intercomparison of the thermometer screens/shields in conjunction with the humidity measuring instruments at the WMD conference. The intercomparison attracted a lot of attention from the audience and local authority. The ET/IOC was invited by the Mr Fahim, the Prefect of the Region, and Mr Abdelmalek Kirouane, General Director of the Office National de la Météorologie (ONM) and the Permanent Representative of Algeria with WMO, to a cocktail where further information on the intercomparison was provided to the Prefect.

1.2 Adoption of the agenda

1.2.1 The ET/IOC adopted the Agenda for the meeting, which is reproduced at the beginning of this report.

1.3 Working arrangements for the session

1.3.1 The working hours and tentative timetable for the meeting were agreed upon.

2. REPORT OF THE CHAIRMAN

2.1 Mr Leroy presented a report of ET/IOC's activities related to the WMO Field Intercomparison of the thermometer screens/shields in conjunction with the humidity measuring instruments. He informed on the process of the selection of participating instruments and activities in support of the calibration phase and intercomparison site preparations.

2.2 The chairman informed that Ms Djazia Bensemene is a regular member of the International Organizing Committee and that she was supervising all local activities related to the intercomparison. The chairman proposed that her status be promoted to become a Project Leader (PL) with the overall responsibility for conducting the intercomparison including the data analysis and presentation of intercomparison results. The ET/IOC accepted the proposal.

3. FIELD INTERCOMPARISON OF THERMOMETER SCREENS/SHIELDS AND HUMIDITY MEASURING INSTRUMENTS, GHARDAÏA, ALGERIA

3.1 Report of the Project Leader

3.1.1 Ms Bensemene informed the ET/IOC on the preparations and the work done at the field intercomparison site, customs clearance of the instruments already in Algiers and a status of their installation. The report is available in French on the CIMO IMOP website. As a summary:

- (a) Site preparation for the 30 screens and 16 humidity sensors (all power and signal lines were installed in the field);
- (b) The data acquisition system for analogue and digital systems was installed and has been tested;
- (c) Some of the ancillary sensors (pyranometer, pyrgeometer, albedometer, sun detector, ultrasonic anemometer) were installed;
- (d) The modem connection to Algiers was set-up;
- (e) The six screens/shields (two Socrima (France) and four Young (USA)) were installed;
- (f) A power generator was purchased and installed;
- (g) Converters RS 232-RS 485 for digital sensors were purchased;
- (h) The ground temperature probes at +10 and + 50 cm were installed in the intercomparison site.
- (i) The Australian and Sudan instruments are currently in the Algeria customs.

3.2 Visit to and evaluation of the intercomparison site

3.2.1 Following the presentation of the PL, the ET/IOC inspected the intercomparison site. It appreciated the remarkable progress made so far, benefited from the substantial investment and capacities provided to the project by the ONM. The ET/IOC made proposals aimed at improving its functionality, details of which are presented in the following items.

3.2.2 The Ghardaïa field was prepared by the local organizing committee according to requirements stated by the ET/IOC. The site has 36 possible positions, which is more than the originally planned. The ET/IOC will take this into consideration in making final decision on the participating instruments and ancillary sensors.

3.3 Presentation of instruments selected for the field intercomparison

3.3.1 The ET/IOC reconfirmed the selection of 17 different types of screens/shields both ventilated and non-ventilated most of them to be installed in pairs (the total number being 29) and 9 different types of humidity sensors most of them to be installed in pairs (the total number being 16). See [Annex II](#) for details of the participating instruments.

3.3.2 The ET IOC was informed that some manufacturers did not respond to the invitation to send instruments for installation. It was decided that those should be contacted during the ET/IOC meeting to verify their willingness and ability to deliver their instruments in time and to select additional instruments to substitute those instruments that for any reason cannot participate in the intercomparison. As a result, the ET/IOC selected the following additional instruments:

- (a) Socrima (French) large Stevenson screen, currently used by Algeria and many other countries, in many synoptic stations. While not initially proposed, the IOC considered that this screen should be included in the intercomparison. The screen will be provided by the ONM;
- (b) Davis Instruments (USA) naturally ventilated screen PN7714, due to a large number of screens used operationally. Even if not normally used by NMHSs, many such screens have been used at voluntary climatological stations;
- (c) Lanser (AUSTRIA) artificially ventilated Stevenson screen, due to an original design and number of screens in operation;
- (d) Fischer & Co. (GERMANY) artificially ventilated screen 431411, due to the original design, number of screens in operation;

3.3.3 The ET/IOC also agreed on the list of candidates in case of delivery problem of newly selected instruments:

- (a) Hungarian Met. Service/ TS/HMS (HUNGARY) naturally ventilated screen;

(b) KNMI (The Netherlands) multiple naturally ventilated screen;

(c) Gerhard Herzog/G90 (GERMANY) naturally ventilated screen.

3.3.4 Several phone contacts were made during the meeting, with the following results and decisions:

- Davis will send two screens directly to Algiers. The Meteo-France supplied Pt100 temperature probes were considered by Davis as suitable for this screen, in their response to the first questionnaire;
- Austria agreed to participate with two ventilated screens;
- Germany agreed to send one or two Fisher's screens, depending on the number of available positions left in the field. This type of screen includes also a hygrometer. The Fisher's company can deliver a calibration certificate for the sensors. Therefore, it was agreed on a direct expedition of the instruments to Algiers to avoid an additional delay with a calibration phase in Trappes.

3.3.5 Mr Lanzinger (member of the ET-SBII&CM) informed the ET/IOC that the German company Thies would supply two ultrasonic wind sensors for the intercomparison. This would allow to measure of the virtual temperature (no influence from solar radiation) from the sensor. This would also allow the calculation of the air temperature, with additional relative humidity and pressure information.

3.3.6 WMO Secretariat is expected to inform the respective Permanent Representatives with WMO and or Hydro-Meteorological Equipment Industry Association (HMEI) on the selection of the above instruments and on the procedure for their transport to Algeria. A letter will be copied to relevant manufacturers and the PL. The PL will contact manufacturers to request additional information and agree on further arrangements.

3.3.7 It was noted that not all manufacturers supplied the ET/IOC with the information/manuals needed for proper design of the acquisition system, installation and maintenance of instruments. It was agreed that the PL would request missing information from manufacturers. Ms Lacombe would assist the PL if needed.

3.3.8 The PL will inform manufacturers on important decisions of the ET/IOC, namely:

- a) Technical assistance by manufacturers may be requested throughout the intercomparison, including a speedy provision of spare parts in case of failure;
- b) Manufacturers should provide maintenance (preventive and corrective) instructions for their instruments, including the filter maintenance and replacement, before the beginning of the project;
- c) Maintenance instructions should indicate if any specific tools or devices are required for regular maintenance;
- d) Request MeteoLabor to provide details on the status messages output by Thygan. (In collaboration with Meteo-France);
- e) Request MeteoLabor to provide details on maintenance and cleaning of the mirror of Thygan for climatic condition in Ghardaïa (in collaboration with Meteo-France);
- f) Request manufactures to indicate the representative height of the screen according to the ISO 17714 (e.g., at which height the screen should be installed so that the temperature measurement is representative for the height of 1.5 m).

3.4 Procedures for and status of the laboratory calibration phase

3.4.1 ET/IOC was informed that Meteo-France had provided calibrated Pt100 probes class A (correction less than ± 0.05 deg) for screens that are suitable with most of the selected screens/shields. The probes were calibrated in a stirred bath for the following four points: -20°C , 0°C , 20°C and 40°C . This calibration showed that all probes were within ± 0.05 deg C. Therefore, it is not necessary to apply correction to the temperature measurements from these probes. See [Annex III](#) for the preliminary results and calibration coefficients.

3.4.2 Screens that do not suit the proposed Pt100 were delivered in Trappes, to calibrate the temperature sensor provided by the manufacturers. This was done in agreement with the manufacturer.

3.4.3 All humidity sensors were also delivered to Trappes for calibration. Humidity calibration was carried out in a climatic chamber. The calibration was made for the following five points of relative humidity: 11%, 33%, 55%, 75% and 90% at two points of temperature: 23°C and 40°C . See [Annex III](#) for the preliminary results and calibration coefficients.

3.4.4 It was decided that calibration data would be used to interpret results and not to correct the measurements.

3.5 Procedures for and status of the installation and supervision of instruments

3.5.1 The ET/IOC decided on the siting and positioning of the participating instruments and the ancillary sensors. See [Annex IV](#). The ET/IOC agreed on the naming convention to be used for any further reference in data acquisition, analysis and processing ([Annex V](#)).

3.5.2 For the duration of the intercomparison, the PL together with the Site manager (SM) will setup a recording process, both manually and digitally, where all the actions taken with respect to the site will be noted and made available in support of data analysis. The electronic logbook will indicate the supervision activities and their respective results. It is acceptable to mark a successful ongoing activity with a checkmark.

3.5.3 Prior to the start of the project, the PL should validate that the installation of sensors has been completed and according to their respective installation guidelines, and data is available to the data acquisition systems. The validation will be conducted through a 2-week end-to-end test, i.e. all instruments running, closely monitoring the received data, and transfer it to Algiers. Any noted anomaly shall be addressed from the point of view of the site installation, the sensors' performance, data transfer, etc., as appropriate. Responsible: PL. The commencing of the intercomparison is conditioned on the confirmed success of the end-to-end test.

3.5.4 All screens should be installed so that the sensitive parts of all sensors are at the same level, at 1.5 meters above the ground, with the maximum tolerance of $\pm 5\%$ of the height. The screen manufacturer should state which point of the screen should be used for measurement of the representative height.

3.5.5 For artificially ventilated screens/shields, the probe orientation and the inlet/outlet orientations shall be documented as wind direction may influence the aspiration rate.

3.5.6 The height of ultrasonic wind sensor will be 50 cm above the top of the highest screen.

3.5.7 Ongoing activities during the intercomparison:

- (a) Daily, check and note the date and the time of the master PC with the reference clock, such as Internet server and GPS. If the absolute time difference is greater than 5 minutes then the time of the master PC should be corrected and difference noted;

- (b) Confirm that the green LEDs on the Data Acquisition System are on; this indicates the normal operation of the system and that data is available. When the green LEDs are not lit, it is recommended to assess the status of the system using the instrument operation/maintenance manual, which will be provided in French translation by Meteo-France;
- (c) Maintain running the application for monitoring the Thygan instruments; check the status messages and indicators. In normal operation, the indicator is green. When turning red, it indicates a malfunction of the instruments or the termination of the application. It is recommended to address any malfunction as per manufacturer manual and maintenance procedure. Restart the application if stopped;
- (d) Run the data quality control program on all data collected in the previous day (or the most recent collecting period). Frequency: daily. The results of the data quality control shall be examined and addressed, as required, by the SM and/or the PL;
- (e) When an instrument in the intercomparison is identified as malfunctioning, it is recommended to contact relevant manufacturer for directions on troubleshooting. It is also recommended that detailed notes on the nature of the malfunction and the actions taken be recorded and stored in the site maintenance logbook;
- (f) In case of power interruption and/or switching onto the backup power supply, it is recommended that the timing of it be logged;
- (g) In case of failure of reference sensors, the SM will initiate through the PL the contact with the supplier for troubleshooting or replacement, as required;
- (h) The following field supervision activities are required for the duration of the intercomparison. It is recommended that the timing of each activity be maintained approximately the same throughout the test and be recorded manually:
 - Visual inspection of the site manually noting any unusual conditions; frequency: daily;
 - Cleaning of the radiation reference sensors, using a lint free cloth; frequency: daily;
 - Listening for at least 10 seconds the ventilation in the artificially ventilated screens, noting any unusual condition. Frequency: daily;
- (i) Regular photos recording the status of each screen/shield, using a digital camera. It is recommended that each picture be time stamped, the image of each screen/shield be consistent and cover two sides for the rectangular screens. It is recommended that the pictures be downloaded and stored on the site PC in monthly files. The picture files should be backed up on an external drive after any update. It is preferable that the order of the pictures be maintain the same for easy access. The picture files will be made available to the PL on a regular basis. Frequency: monthly; the suggested timing is the beginning of the first week of each month;
- (j) Photo recording of any screen/shield or instrument, using a digital camera, in case of a suspected visual anomaly or in case of possible problems with the ventilation of the screens/shields, in which case a picture of the filter should be made. It is recommended to follow the same recording and storing methodology as above. Frequency: as needed. Follow-up: address status with the PL, investigate anomaly by using manufacturer provided information.

3.5.8 The ET/IOC adopted the use of the following ancillary data and metadata:

- a) Radiation sensors (pyranometer, pyrgeometer, albedometer, sun detector);
- b) One ultrasonic anemometer (Gill), provided by Algeria and two ultrasonic anemometers (Thies) provided by Germany;
- c) Tipping bucket rain gauge (from the local Ghardaïa AWS);
- d) Pressure (from the local Ghardaïa AWS);
- e) 10 m wind speed and direction (from the local Ghardaïa AWS);
- f) Still pictures of every instrument taken once in a month and at special events;
- g) All regular manually observed data at the Ghardaïa meteorological station;
- h) An electronic logbook has to be used by local staff to record all actions performed and observations made concerning the functionality of the instruments.

3.6 Data acquisition, processing and analysis methodology

3.6.1 The ONM acquired a new Data Acquisition System (DAS) from YOKOGAWA (Japan) for the intercomparison site (Annex VI). Meteo-France is using the same DAS, therefore, assistance will be provide as necessary;

3.6.2 The DAS for analogue instruments consists of three main units (MW 100). The first one contains five modules with universal entries (MX110-UNV-M10) and one module for Pt100 (04 wires) (MX110-4VR-M06). The second unit is equipped with six modules for Pt100 (04 wires) (MX110-4VR-M06). The third one is containing one module for digital entries (MX115-D05-H10). Each main unit comes with a Web server function, allowing users to easily enter settings and monitor measured data from a PC using a web browser. The time of the DAS is automatically synchronized with the master PC. Each DAS unit provides daily files.

3.6.3 For digital instruments, the PC used for acquisition is provided by two multiport cards (AccelePort Xr 920 Family). Digital sensors are connected to this card. This PC is called master PC. Dedicated software has been developed for acquisition of data. With regard to the distance between sensors and the computer, RS232/RS485 converters are used.

Data acquisition

3.6.4 Data sampling rate will be ten seconds (six samples per minute) on the data acquisition unit. If it is possible and with agreement with manufacturers, the sampling rate for digital sensors will be the same (ten seconds).

3.6.5 Average one-minute values will be calculated from raw data. This calculation will include quality control tests.

3.6.6 Thygan sensors deliver one measurement only every ten minutes.

3.6.7 For additional wind measurement, data sampling rate will be two samples per second. Ten-minute and two-minute averages and wind gusts will be updated every minute and stored. Virtual temperature from ultrasonic sensor will be stored.

Data storage and transfer to Algiers

3.6.8 Raw data (ten-second samplings) and one-minute average data will be stored on the master computer and an external hard disk in Ghardaïa. Data transfer to Algiers will be done via dial up modem PTT connection to avoid potential security problems with the Internet use. Raw data and one-minute data will be also stored in Algiers.

Data Analysis

3.6.9 For air temperature, the data analysis methodology will be based on the draft ISO standard 17714: "Meteorology - Air Temperature Measurements - Test methods for comparing the performance of thermometer shields/screens and defining important characteristics". The draft standard is being distributed to ISO members for final approval. Only the field test methods of ISO 17714 will be applied.

3.6.10 Description of the data analysis and software to be used for data analysis is in Annex VII.

3.6.11 For the temperature screen intercomparison, a relative reference will be chosen amongst the participating artificially ventilated screens. The coldest screens during day (with high solar radiation and low wind speed) will be the best candidates. The relative reference screen should be chosen after a first analysis of data.

3.6.12 Taking into account relevant CIMO recommendation, the ventilated thermo-hygrometer VTP 6 (Thygan chilled mirror dew point hygrometer), produced by METEOLABOR AG, Switzerland, shall be used as the initial reference system for humidity sensors intercomparison.

3.6.13 In the past years, Meteo-France (MF) developed a specific software package to handle and analyze large volume of intercomparison data. The ET/IOC chair briefly demonstrated the software package. It allows a fast visual comparison of data on temporal curves; classification of data with various criteria (ranges of wind, solar radiation, etc.), importation and exportation of data in self documented ASCII files, etc. This software was used by MF for previous national intercomparisons in Trappes (presented during TECO1998) and was used to illustrate examples in the draft ISO standard 17714. During 2006, this software was delivered and explained to the PL during her visit in Trappes (September 2006) and during the visit of Ms Lacombe in Algiers/Ghardaïa (November 2006). This software will be made available to the ET/IOC.

3.6.14 The ET/IOC considered the availability of the software package as very positive for the project, thus minimizing the possible risks.

3.6.15 The software package will also be used for the relative humidity data analysis (Annex VII):

Data Policy

3.6.16 The ET/IOC agreed on the following data policy principles:

- The WMO has the copyright on the intercomparison database.
- The complete intercomparison database is kept by WMO Secretariat, the ET/IOC chair, the PL and SM. WMO may, if requested by the ET/IOC, export whole or part of the comparison database on to the CIMO/IMOP website, or other website controlled by the ET/IOC members, as soon as the Final Report is published.
- After the Intercomparison, every participant could get a copy of the comparison database, containing any further raw data obtained during the tests, related to its own instruments.

- The WMO authorizes the ET/IOC chair (in collaboration with the PL and the SM) to publish full results in the Final Report of the intercomparison on behalf of the ET/IOC.
- The ET/IOC members may publish their partial scientific results if demanded by the scientific community before the end of the intercomparison, provided the publication is authorized by the ET/IOC chair.
- The comparison database may be provided to other parties for the purpose of scientific studies on the subject. This requires an approval of the ET/IOC chair, and is possible only after the full results of the intercomparison have been published.
- For the publication and for the third parties, the participants are only allowed to use data of their own instrument. In doing so, they will avoid qualitative assessment of their instruments in comparison with other participating instruments.

3.7 QC/QA and supervision of the field intercomparison

3.7.1 The ET/IOC agreed on the Quality Control and Quality Assurance for the field intercomparisons in accordance with the general guidance written in the WMO Guide on the GOS, WMO-No. 488 (Annex VIII).

3.7.2 Further details including the implementation of an automated technical monitoring system will be worked out by the PL and the SM before the start of the intercomparison. This proposal will be provided to the ET for approval before the end of May 2007 so that the QA/QC system is implemented prior to the start of the trial period.

3.8 Access to raw data and to the database

3.8.1 The ET/IOC members will use a FTP server from the ONM to access the intercomparison data. Specific login and password will be provided by the ONM for this purpose.

3.8.2 Data and latest monthly metadata on the FTP server will be updated regularly (daily during working days) as follows:

- Documentation of the file organization of the FTP server (for the intercomparison database);
- The one minute database (BDDGEN files);
- Daily QC files;
- Pictures in JPEG format;
- An electronic copy of the local (Ghardaïa) logbook.

3.8.3 The raw data will not be systematically copied on the FTP server. Relevant raw data will be copied as daily ASCII files when discussion is needed within the ET/IOC.

4. WORK PLAN

4.1 Following the status of the field site preparations, the ET/IOC agreed that the targeted date for the end of the installation of the participating instruments at the intercomparison site will be moved to end of May 2007. May and June would be dedicated to a trial, at the end of which the PL and the ET/IOC chair decide on "GO" for the operational intercomparison period. The update planning of the intercomparison project is in Annex IX.

4.2 The ET/IOC discussed the future Work Plan of the team. It agreed that Ms Nitu would, in consultation with CCI, Antarctic WG, WCRP-CLiC, WCP, CHy, CAgM, CBS and GCOS, assess the methods of measurement and observation of solid precipitation, snowfall and snow depth at automatic unattended stations used in cold climates (polar and alpine), and especially for those countries participating in IPY. She will concentrate especially on:

- Document the needs and assess the compatibility of measurement standards and requirements of WMO Technical Commissions for the measurement of solid precipitation, snowfall and snow depth at automatic unattended stations for cold climate precipitation measurement;
- Prepare national summaries of methods, issues and challenges of automated solid precipitation measurement in cold climate countries; Information needed includes, for example, instruments used, shielding configuration, measurement interval, processing algorithms, wind adjustment procedure (if applicable), height of wind measurement, etc;
- Assess the need for an intercomparison of methods and equipment for automated snowfall/snow depth/precipitation measurements in cold climate regions, on both global and regional basis and develop an intercomparison plan(s) during the IPY period (March 2007-March 2009).

4.3 The ET/IOC proposed to organize and conduct the WMO Combined Intercomparison of Thermometer Screens/Shields in Conjunction with Humidity Measurements in an arctic environment in Iqaluit, on Baffin Island, Territory of Nunavut, Canada, planned to begin in mid 2009, with a tentative schedule as follows:

- Selection of instruments: 2nd half 2008-2009;
- Site preparation: Summers 2008 and 2009;
- Delivery of instruments to Canada in preparation for the spring sealift to the site: 1st quarter 2010;
- Delivery to the site and installation of instruments: mid 2010;
- Intercomparison: October 2010-Sept 2011;
- Final report: 1st quarter 2012.

4.4 The planning of the intercomparison in the arctic environment will have to take into consideration the limitations related to the transportation of equipment and materials to the site and the reduced window of opportunity for site preparation and installation in the arctic (July-Sept).

5. DRAFT REPORT OF THE SESSION

5.1 The members of Expert Team and International Organizing Committee approved a draft report of the meeting.

6. CLOSURE OF THE SESSION

6.1 The session was closed on 23 March 2007 at 14.00 h.

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Participating instruments

Member country	Manufacturer	Type	Acronym	Delivery	Screens				Humidity sensors		Acquisition	Status on the 19 March 2007
					Type		Pt100 MF	Output	Number	Output		
					Nat.	Art.						
Algeria	Socrima	Large Stevenson Screen	LSOC	Algiers	1		1	4-Wire			DAS	to be installed
Australia	BoM	Small Stevenson screen	LBOM	Algiers	2		2	4-Wire			DAS	in customs
Austria	Lanser		LLAN	Algiers	2		2	4-Wire			DAS	to be sent
France	Socrima	BMO1195D	SSOC	Algiers	2		2	4-Wire			DAS	installed
Germany	Fischer	431411	VFIS	Algiers		1/2	1/2	4-Wire	2	Voltage	DAS	to be sent
Germany	Vaisala	HMT337 & HMT 330 MIK	SVAI	Trappes	2			RS232	2	RS232	DS	in Trappes
Germany	Eigenbrodt / Vaisala	HMP45D / LAM630	VEIG UHMP	Trappes		2	4	4-Wire	4	Voltage	DAS	in Trappes
Germany	Testo	AG/63379742	UTES	Trappes					2	Voltage	DAS	in Trappes
Italy	CAE	TU20AS	SCAE	Algiers	2			4-Wire	2	Voltage	DAS	in Trappes
Sudan	Casella	Stevenson Screen	LCAS	Trappes	1		1	4-Wire			DAS	in customs
Switzerland	Meteolabor	Thygan VTP37 Airport	VTHY	Trappes		1		RS232	1	RS232	DS	in Trappes
Switzerland	Meteolabor	Thygan VTP37 Thermohygrometer		Trappes		1		RS232	1	RS232	DS	in Trappes
Switzerland	Rotronic	AG/RS12T & Hygroclip S3	VROT	Trappes		2		Voltage	2	Voltage	DAS	in Trappes
UK/HMEI	Metspec	MET01	LMET	Algiers	2		2	4-Wire			DAS	no news
UK/HMEI	Windspeed	T351-PX-D/3	SWIN	Trappes	2			4-Wire			DAS	in Trappes
USA	Davis	PN7714	SDAV	Algiers	2		2	4-Wire			DAS	to be sent
USA/HMEI	Young	41003	SYOU	Algiers	2		2	4-Wire			DAS	installed
USA/HMEI	Young	43502	VYOU	Algiers		2	2	4-Wire			DAS	installed

DAS stands for Data Acquisition Unit

DS stands for Dedicated Software

Ancillary instruments acquisition

Measurement	Model	Output	Acquisition
Wind at 2 m height	Windsonic	RS232	DS
Wind at 2 m height	Thies	RS232	DS
Wind at 10 m height	Local AWS Ghardaia station		
Pressure			
Precipitation			
Global solar radiation	CM11B	Voltage	DAS
Duration of sunshine	Cimel	Pulse	DAS
Long-wave net radiation	CG4	Voltage	DAS
Surface albedo	CM14B	Voltage	DAS
Ground temperature	Pt100	4-Wire	DAS
Temperature profile	Pt100	4-Wire	DAS

DAS stands for Data Acquisition Unit

DS stands for Dedicated Software

Status of calibration phase

Member country	Manufacturer	Type	Humidity calibration	Temperature calibration
Germany	Vaisala	HMT337 & HMT 330 MIK	Done	
Germany	Eigenbrodt / Vaisala	HMP45D / LAM630	Done	Done
Germany	Testo	AG/63379742	Done	
Italy	CAE	TU20AS	Not possible	Not possible
Switzerland	Meteolabor	Thygan VTP37 Airport	Not possible	Not possible
Switzerland	Meteolabor	Thygan VTP37	Not possible	Not possible
Switzerland	Rotronic	AG/RS12T & Hygroclip	Done	
UK	Windspeed	T351-PX-D/3		Done

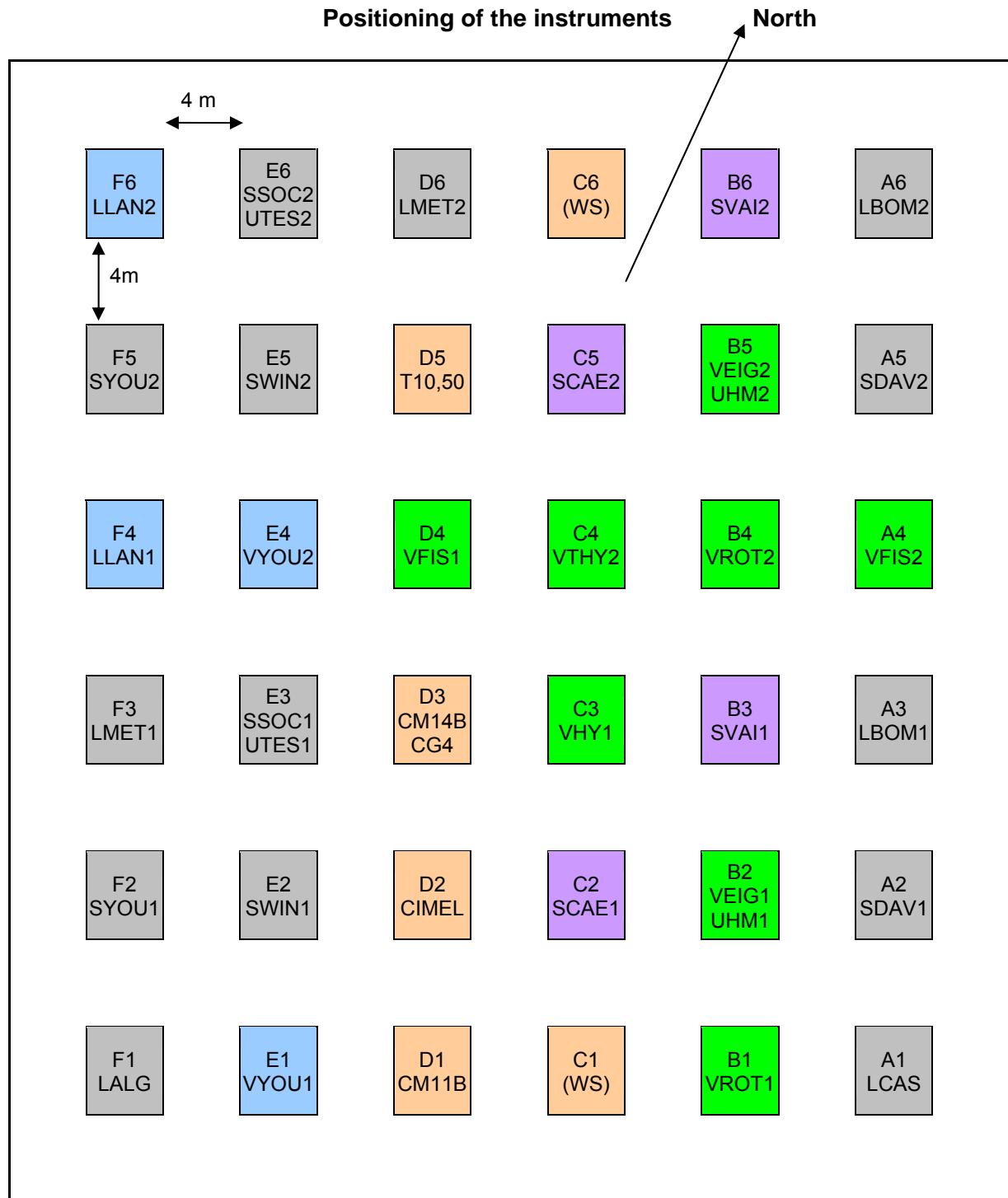
Humidity calibration: relative humidity differences between sensor and reference

Manufacturer	Model	Serial No	Date of calibration	Operator	Temperature (°C)											
					22	23					40					
						Relative Humidity (%)										
						50	11	33	55	75	90	11	33	55	75	
Fischer	431411															
Fischer	431411															
Vaisala	HMT337	B4940009	20/03/2007	Meteo-France		0.3	-0.7	-0.4	-1.1	-2.6	0.3	0.8	3.7	-2.3	2.2	*
Vaisala	HMT337	B4940010	12/02/2007	Meteo-France		-0.2	0.3	-0.5	-0.9	-1.3	0.3	0.6	0.5	0.4	0.9	*
Vaisala	HMP45D	A3810054	09/01/2007	Meteo-France		-0.1	1.7	1.0	1.0	2.1	0.5	2.8	2.2	2.7	3.5	*
Vaisala	HMP45D	A3810083	09/01/2007	Meteo-France		0.0	1.8	0.9	0.9	2.0	0.5	2.3	1.0	0.9	1.5	*
Vaisala	HMP45D	B4740049	09/01/2007	Meteo-France		-0.3	1.4	0.3	0.5	1.7	0.0	2.3	1.6	2.1	3.1	*
Vaisala	HMP45D	B4740050	09/01/2007	Meteo-France		-0.3	1.7	0.6	0.6	1.8	0.2	2.4	1.6	1.8	2.8	*
Testo	6337-9742	960104	22/12/2006	Meteo-France		-0.2	0.2	0.5	1.2	1.9	-0.4	-0.4	-0.5	0.6	1.4	
Testo	6337-9742	973764	22/12/2006	Meteo-France		-0.6	-0.4	-0.2	0.7	1.4	-0.8	-0.8	-1.1	0.0	1.2	
CAE	TU20AS															
CAE	TU20AS															
MeteoLabor	Thygan	338	June2005	MeteoLabor	0.35											
MeteoLabor	Thygan	339	June2005	MeteoLabor	0.43											
Rotronic	S3	45003017	08/03/2007	Meteo-France		-1.4	0.0	0.6	0.9	1.2	-0.5	0.1	0.7	1.1	2.7	*
Rotronic	S3	45003016	08/03/2007	Meteo-France		-1.7	-0.1	0.7	0.7	1.3	-0.7	0.1	0.7	1.3	3.1	*

Temperature calibration: temperature differences between sensor and reference

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Screen	Sensor model	Serial No	Date of calibration certificate	Operator	Temperature (°C)					
					-20	0	20	22	40	
	Meteo-France	674	30/03/2006	Meteo-France	-0.0272	-0.0563	-0.0778		-0.0944	
Ground temperature	Meteo-France	2417	27/07/2004	Meteo-France	0.0520	0.0490	0.0540		0.0620	
	Meteo-France	T44	30/01/2006	Meteo-France	0.0160	-0.0124	-0.0319		-0.0473	
	Meteo-France	T45	09/02/2006	Meteo-France	0.0337	0.0072	-0.0113		-0.0267	
	Meteo-France	T47	30/01/2006	Meteo-France	0.0558	0.0286	0.0066		-0.0112	
	Meteo-France	T49	09/02/2006	Meteo-France	0.0273	-0.0022	-0.0230		-0.0383	
	Meteo-France	T51	08/02/2006	Meteo-France	0.0304	0.0031	-0.0131		-0.0261	
	Meteo-France	T53	03/02/2006	Meteo-France	0.0246	-0.0032	-0.0216		-0.0346	
	Meteo-France	T54	08/02/2006	Meteo-France	0.0241	-0.0030	-0.0189		-0.0307	
	Meteo-France	T55	01/02/2006	Meteo-France	0.0157	-0.0128	-0.0294		-0.0435	
	Meteo-France	T64	03/02/2006	Meteo-France	0.0520	0.0201	-0.0047		-0.0268	
	Meteo-France	T70	01/02/2006	Meteo-France	0.0100	-0.0184	-0.0382		-0.0542	
	Meteo-France	T71	26/01/2006	Meteo-France	-0.0013	-0.0295	-0.0485		-0.0647	
	Meteo-France	T73	26/01/2006	Meteo-France	0.0230	-0.0057	-0.0297		-0.0477	
	Meteo-France	T74	26/01/2006	Meteo-France	0.0019	-0.0247	-0.0439		-0.0598	
	Meteo-France	T75	24/01/2006	Meteo-France	0.0207	-0.0110	-0.0343		-0.0541	
	Meteo-France	T76	24/01/2006	Meteo-France	-0.0262	-0.0520	-0.0695		-0.0839	
	Meteo-France	T77	24/01/2006	Meteo-France	0.0146	-0.0175	-0.0411		-0.0632	
Vaisala	HMT337	B4940010	04/01/2007	Vaisala				-0.04		
Vaisala	HMT337	B4940009	04/01/2007	Vaisala				-0.04		
CAE	TU20AS									
CAE	TU20AS									
Meteolabor	Thygan	338	June2005	MeteoLabor				-0.03		
Meteolabor	Thygan	339	June2005	MeteoLabor				-0.05		
Rotronic	RS12T									
Rotronic	RS12T									
Windspeed	T351PX	1397	14/03/2007	Meteo-France	0.0148	-0.0381	-0.0825		-0.1232	*
Windspeed	T351PX	1398	14/03/2007	Meteo-France	0.0145	-0.0335	-0.0727		-0.1070	*



See Annex V for acronyms

Naming conventions

No.	Member Country	Manufacturer/ Type of the sensor/screen	Numbers				Name
			Type of the screen		Humidity	Screen & RH	
			Nat.	Art.			
1	Australia	BoM	2				LBOM
6	France	Socrima/ BM0 1195 D 0000	2				SSOC
9	Germany	Vaisala/HMT 337 & HMT 330MIK	2		2	2	SVAI
10	Germany	Eigenbrodt/LAM630 , Vaisala HMP45D		2	2		VEIG,UHMP
11	Germany	Testo AG/63379742			2		UTES
14	Italy	CAE S.p.A./TU20AS	2		2	2	SCAE
21	Sudan	Casella	1				LCAS
23	Switzerland	Meteolabor AG/Thygan VTP37 Airport		1	1	1	VTHY1
24	Switzerland	Meteolabor/Thygan VTP37		1	1	1	VTHY2
25	Switzerland	Rotronic AG/ RS12T		2	2	2	VROT
27	UK /HMEI	Metspec/ MET 01	2				LMET
29	UK /HMEI	Windspeed Ltd./ TRSI-PX-D/3	2				SWIN
35	USA/HMEI	Young/ 41003	2				SYOU
36	USA/HMEI	Young/ 43502		2			VYOU
A1	Algeria	Socrima/ Grand modele	1				LSOC
A2	USA/HMEI	Davis Instr./ PN 7714	2				SDAV
A3	Austria	Lanser	2				LLAN
A4	Germany	Fisher		1/2		1/2	VFIS
	Algeria	Ancillary measurements Solar radiation (pyranometer CM6B Kipp&Zonen) Sunshine duration (Cimel) Infra Red radiation (pyrgeometer CG4 Kipp&Zonen) Albedo (albedo meter, Kipp&Zonen) Wind (ultrasonic sensor from GILL and THIES) Rain gauge (tipping bucket from Précis Mécanique) Pressure (Drück)					AKIP ACIM AKIP AKIP AGIL ATHI APRE ADRU

Naming conventions

- (a) First letter indicates the type of screen or a “separate” humidity sensor
- S for a “small” naturally ventilated screen
 - L for a “large” naturally ventilated screen
 - V for an artificially ventilated screen
 - U for a hygrometer independent on a given screen
 - A for ancillary information (solar radiation, wind, ...).
- (b) Three other letters indicate the name of the manufacturer
1 or 2 for each screen/instrument in pairs.
- (c) The name of a parameter associated to a given screen/instrument is added after the name of the screen/instrument.
- _T for air Temperature
 - _Tn for daily minimum air temperature
 - _Tx for daily maximum air temperature
 - _RH for Relative Humidity
 - _DP for Dew Point
 - _GR for solar Global Solar Radiation
 - _SD for Sunshine Duration
 - _IR for Infrared Radiation
 - _Aup for albedometer upcoming solar radiation
 - _Ado for albedometer downcoming solar radiation
 - _Al for albedo
 - _IR for long-wave net radiation
 - _Tg for ground temperature
 - _T10 for temperature 10 cm above ground
 - _T50 for temperature 50 cm above ground
 - _ff10 for mean wind speed over 10 minutes
 - _dd10 for mean wind direction over 10 minutes
 - _ff2 for mean wind speed over 2 minutes
 - _dd2 for mean wind direction over 2 minutes
 - _FFx for max. wind speed over 1 minute
 - _VT for virtual temperature from ultrasonic sensor
 - _UST for calculated air temperature from VT ultrasonic

Example:

SSOC1_T means: air Temperature in Small SOCRima n° 1

Data Acquisition System Specifications

These specifications are not exhaustive; please refer to manufacturers' websites for further details.

For analogue instruments, the ONM has acquired a data acquisition system from manufacturer Yokogawa.

This system is composed of:

- Three main units model MW100
- Five universal input modules model MX110-UNV-M10
- Seven four-wire RTD input modules model MX110-4VR-M06
- One high speed digital input module model MX115-D05-H10
- One battery and one inverter in case of shut down of mains power

In order to avoid any loss of data, the ONM had acquired a double system.

Specifications of main units:

- Maximum number of inputs: 60
- Up to 6 modules per unit
- Measurement interval: from 10 ms to 60 s. Up to three different intervals can be defined per unit.
- One slot for Compact Flash Type II card. Measured data, computed data, configuration can be saved to CF card.
- Communication by Ethernet interface.

Specifications of modules for 4-Wire Pt100 measurements (high resolution):

- Number of entries: 6 per module
- Measurement current: 1mA
- Measurement range: -140 to 150°C
- Highest resolution: 0.01°C

Specifications of modules for universal input measurements (DC voltage):

- Number of entries: 10 per module
- Highest resolution: 100 µV for 2V measurement range

Specifications of digital input module:

- Number of entries: 10 per module
- Input type: non voltage contact or 5V level

For digital instruments, the ONM had acquired two multiport cards model AccelePort Xr920 from manufacturer Digi International.

Specifications of these cards:

- 8 RS232 serial ports
- Speeds up to 921600 bps

DATA ANALYSIS

I. Description of the analysis software

During past years, Météo-France developed a set of software to analyse data for intercomparisons. These programs run under DOS operating system, but can be used under Windows®. They allow to manage a large volume of data, as it can be available with one minute values over a period of one year.

These programs record and use data in specific daily files, forming a type of database, called BDDGEN. Parameters are identified by names, such as the names defined in the annex, “naming conventions”.

Programs are available to:

- Import data from ASCII files
- Export data to ASCII files
- Display graphics (parameter versus time) with an easy change of parameters, of the time scale.
- Calculate and displays “box plots” of differences (sensor versus reference) : for a given range of a parameter, calculation of median values, interval with 50% of values, 90% of values, 99% of values.
- Filter values with various logical conditions
- Calculate additional values.

Examples of some output can be seen in the draft ISO standard 17714 and are shown below.

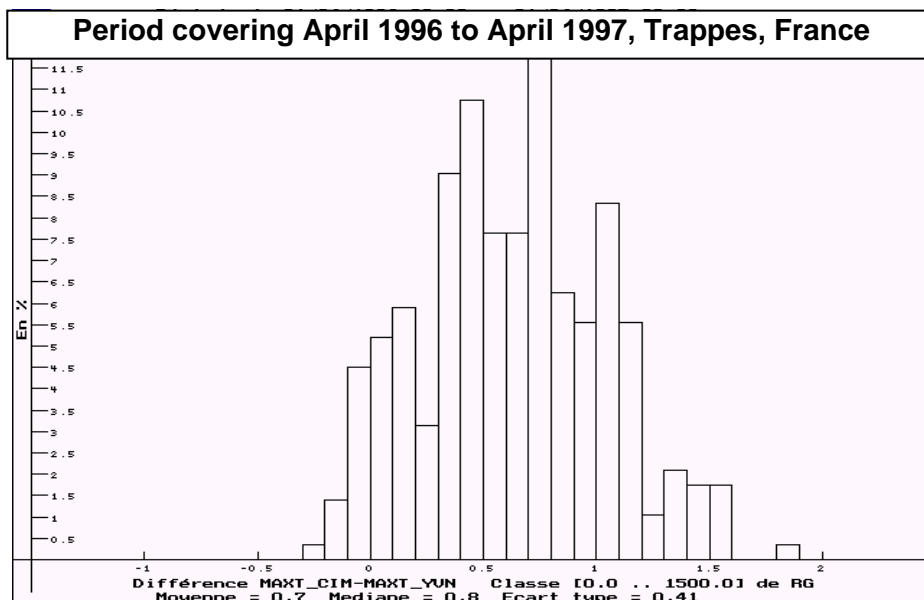


Figure B.1 — Histogram of differences of daily maximum temperatures between a given screen and a ‘reference’

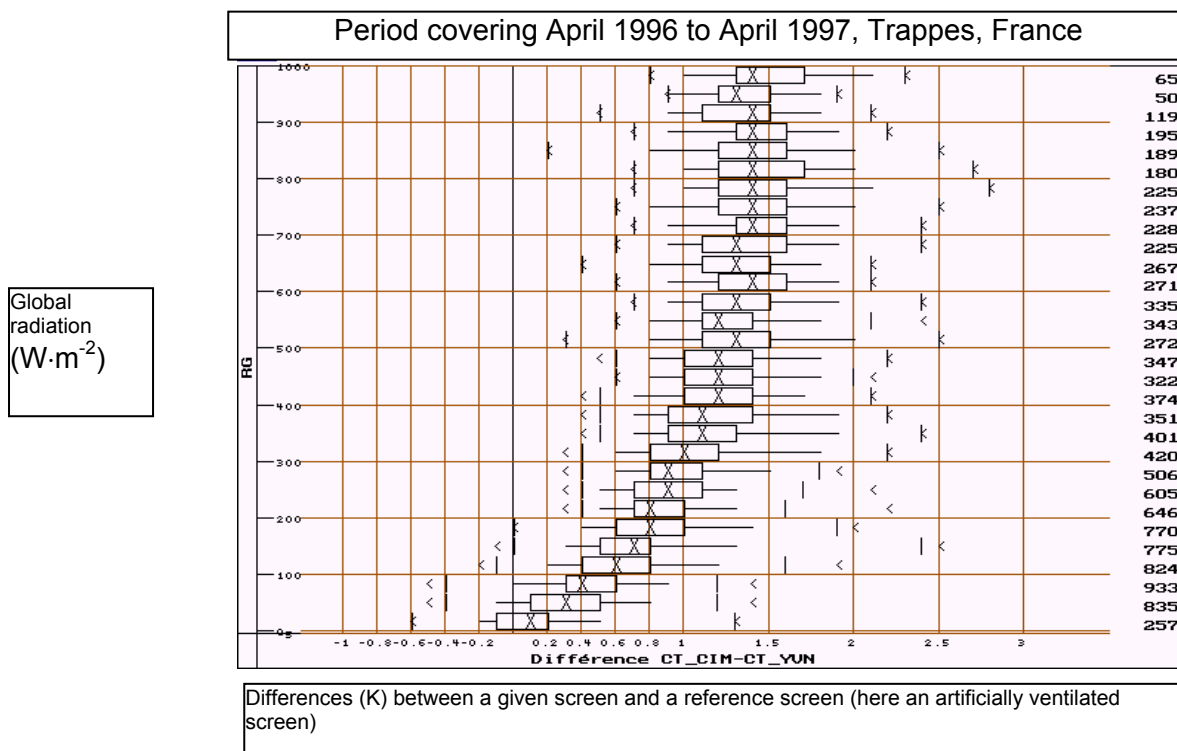


Figure B.3 — Example of box plots showing temperature differences related to solar radiation

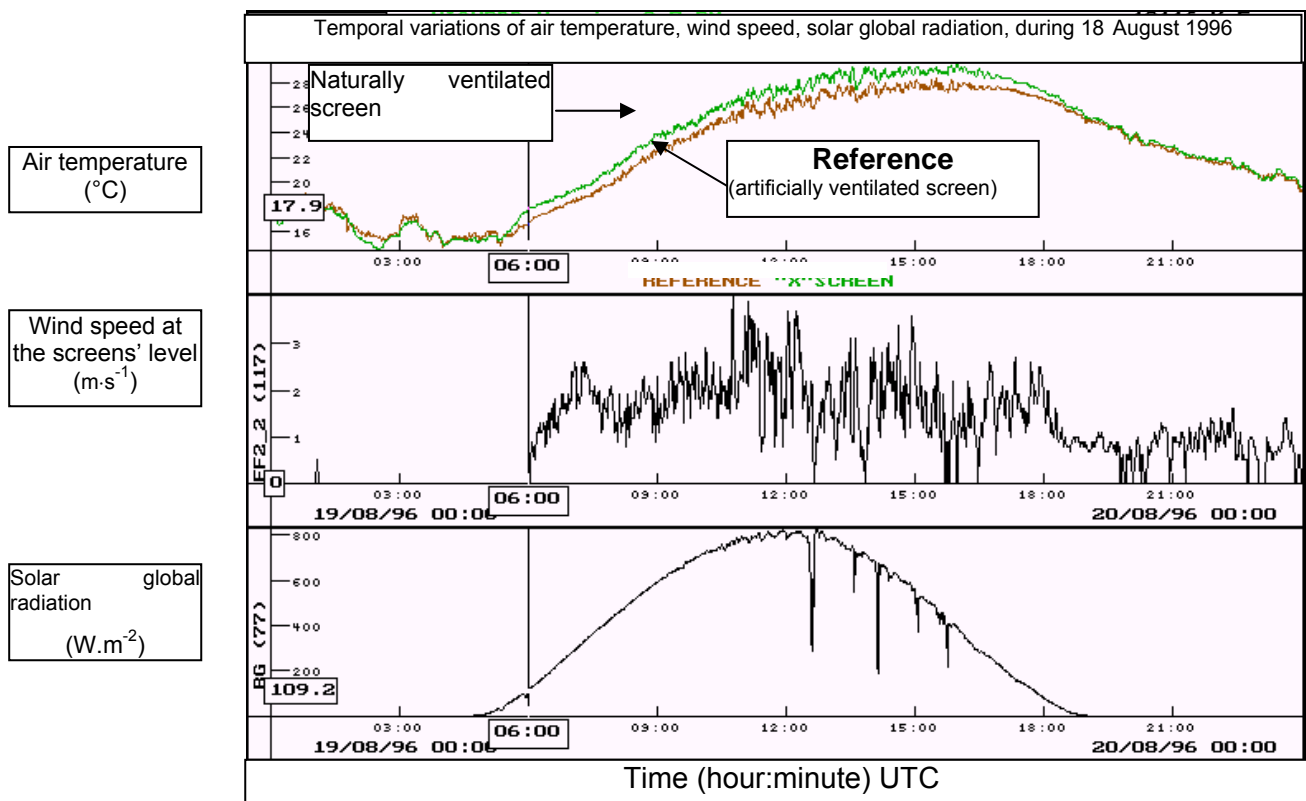


Figure B.4 — Example of temporal curves

The upper window shows the temperature of 2 screens for a 24 hours period in August in Trappes, France. One is for an artificially ventilated screen, taken as a relative reference. The other one is for a naturally ventilated screen. Differences may be seen during day time (06:00 to 18:00). The middle window shows wind speed measured at a 2 meters level. Average one minute wind speed was between 0 and 3 m·s⁻¹. The bottom window shows solar global radiation in W·m⁻². The regular shape of this curve shows that this daily period was very sunny, with just some clouds in the afternoon.

II. Description of the data analysis

For temperature, data analysis will follow the draft ISO standard 17714

Analysis of mean values of temperature/humidity measurements:

- a) Analysis of the daily profiles of the temperature and humidity;
- b) Analysis of the differences of one-minute values of the measured temperature/humidity parameter (reference screen - tested screen). A histogram of these differences should be drawn for the whole period to give a first indication of the observed differences. The differences should be further analyzed.
- c) Analysis of one-minute data provides the information on the effect of solar radiation and wind speed respectively on the temperature/humidity parameter measured in each screen: statistics of differences in temperature/humidity in various screens for different classes of global radiation and wind speed respectively should be analyzed.

Analysis of mean values of differences of humidity measurements (reference screen – tested screen):

Analysis of mean monthly differences of humidity measurements: Analysis of deviation for the tested screen/shield as the function of the reference humidity measurements. The mean differences will be computed for humidity intervals of 10 % and for different temperature classes (with a span of 5 or 10 °C).

The comparison between these analysis at the beginning and the end of the intercomparison will give information about a possible drift of the sensors.

Analysis of extreme differences of temperature/humidity measurements (reference screen – tested screen):

a) The conditions leading to extreme measurement errors of temperature/humidity measurements are not readily apparent. This can be overcome by identifying extreme differences between the reference screen and the tested screen and then investigating the current meteorological conditions during these differences. If the screens have different time constants and temperature/humidity variation with time is high, this may be the cause of such differences. Therefore, such comparison should be conducted on daily extreme values, to be more representative.

b) Daily extreme values (minimum and maximum) should be computed for each screen from the one-minute database. The histograms of the differences of corresponding daily extreme values (reference screen – tested screen) for the whole period should be drawn and the differences should be further analyzed.

Analysis of temperature/humidity measurements for typical conditions experienced during the intercomparison period:

a) A statistical analysis of temperature/humidity differences (reference screen – tested screen) for different classes of meteorological conditions should be done with the goal to analyze the effects of the individual meteorological variables and their combinations. Below listed effects should be

analyzed using the whole database and specific filters on the influence parameters and appropriate combinations of them:

- Global solar radiation to be consider with the categories:

- o radiation $\leq 0 \text{ Wm}^{-2}$

- o radiation > 0 and $\leq 100 \text{ Wm}^{-2}$

....

- o radiation > 900 and $\leq 1000 \text{ Wm}^{-2}$

- o radiation $> 1000 \text{ Wm}^{-2}$

- Wind speed to be consider with the categories:

- o wind speed $\leq 1.0 \text{ m.s}^{-1}$

- o $1.0 \text{ m.s}^{-1} < \text{wind speed} \leq 4.0 \text{ m.s}^{-1}$

- o wind speed $> 4.0 \text{ m.s}^{-1}$.

- Day/night (radiation effect);

- Night time: clear sky/overcast (radiation effect);

- Hydrometeors occurrence, especially precipitation, dry/wet conditions;

b) A graphical description of weather experienced during the intercomparison should be drawn, with temporal curves of temperature, relative humidity, global radiation, wind speed and significant precipitation occurrence. From this description periods with typical conditions for the whole intercomparison period should be identified.

Temperature/humidity differences (reference screen – tested screen) should be displayed for these typical conditions. These curves should help to explain the screen or sensor performance and to understand the origin of the differences.

Differences plotted against time quickly show the changes with respect to changes in the weather conditions.

Analysis of special situations (selected periods containing events of particular significance):

(a) Statistics calculated from a large number of observations can show small differences between screens and hide differences that occur in only a few, rather rare, circumstances.

(b) A combination of the daily profiles of those differences with temperature/humidity profiles can reveal these situations. Examples of those could be:

- a day with precipitation occurrence and rapid change of relative humidity;
- sunrises and sunsets in case of clear sky, etc.

QUALITY CONTROL OF DATA

Data quality control (QC) will be carried out before and during the data analysis. Time and detail of any intervention during the intercomparison that could cause erroneous or suspicious data shall be noted so that such data will not be used in data analysis.

The QC flags will be as follows (according to BUFR table 033020):

- “0” - good (accurate; data with errors less than or equal to a specified value);
- “1” - inconsistent (one or more parameters are inconsistent; the relationship between different elements does not satisfy defined criteria);
- “2” - doubtful (suspect);
- “3” - erroneous (wrong; data with errors exceeding a specified value);
- “7” - missing data.

The following automatic real-time and near-real-time QC procedures of all measured data will be implemented in the Data Acquisition System:

I. QC of screen temperature and humidity data:

1) QC of samples:

All samples will be taken into account for the calculation of one-minute data. There has to be at least four/five samples available to compute one-minute value; if less than four samples are available in one minute, the one-minute value is not calculated and used in further computation of a relevant parameter; the value will be flagged as missing.

2) QC of one-minute data

a) Plausible value check

- Air temperature: -25 °C to +65 °C;
- Relative humidity: 0 – 125 % (deliberately higher than 100%);
- Dew point temperature: -50 °C to +50 °C.

If the value is outside the acceptable range limit it is flagged as erroneous.

b) Time consistency check

- **Check on a maximum allowed variability of an one-minute value (a step test):** if the current one-minute value differs from the prior one by more than a specific limit (*step*), then the current one-minute value will be flagged as doubtful (suspect). The limits of a maximum variability (the absolute value of the difference between the successive values) will be as follows:

Parameter	Limit for suspect	Limit for erroneous
Air temperature:	3 °C	
Dew point temperature:	2 - 3°C; 4 - 5°C	4°C
Relative humidity:	10 %	15%

- **Check on a minimum required variability of one-minute values** during a certain period (*a persistence test*), once the measurement of the parameter has been done for at least 60 minutes. If the one-minute values do not vary over the past at least 60 minutes by more than

the specified limit (*a threshold value*) then the current one-minute value fails the check. The limits of minimum required variability will be as follows:

- Air temperature: 0.1°C over the past 60 minutes;
- Dew point temperature: 0.1°C over the past 60 minutes;
- Relative humidity: 1% over the past 60 minutes when RH is above 50 %.

If the value fails the time consistency checks it should be flagged as doubtful (suspect).

c) Internal consistency check

- dew point temperature \leq air temperature;

If the value fails the internal consistency checks it will be flagged as inconsistent.

II. QC of data from ancillary sensors:

3) QC of samples

a) Plausible value check (the gross error check on measured values)

Each sample has to be examined if its value lies within the measurement range of a pertinent sensor. If the value fails the check it is rejected and not used in further computation of a relevant parameter.

b) Check on a plausible rate of change (the time consistency check on measured values)

After each signal measurement the current sample shall be compared to the preceding one. If the difference of these two samples is more than the specified limit then the current sample is identified as suspect and not used for the computation of an average. However, it is still used for checking the temporal consistency of samples. It means that the new sample is still checked with the suspect one. The result of this procedure is that in case of large noise, one or two successive samples are not used for the computation of the average. In case of the sampling intervals 10 seconds the limits of time variance of the successive samples (the absolute value of the difference) implemented will be as follows:

- Global solar radiation (irradiance): 800 Wm⁻². (CM11B);
- Surface albedo (CM14B); (value to be proposed by the PL)
- Long-wave net radiation (CG4); (value to be proposed by the PL)

There should be at least four/five samples available to compute one-minute value; if less than four/five samples are available in one minute, the one-minute value will not be calculated and used in further computation of a relevant parameter; the value will be flagged as missing.

4) QC of one-minute data

a) Plausible value check

The limit values implemented will be as follows:

- Air temperature: -90 °C – +70 °C;
- Ground (surface) temperature: -20 °C – +80 °C;
- Wind direction: 0 – 360 degrees;
- Wind speed: 0 – 75 ms⁻¹ (1-minute, 10-minute average);
- Wind gust: 0 – 150 ms⁻¹;

- Global solar radiation (irradiance): 0 – 1600 Wm⁻²; (CM11B);
- Surface albedo (CM14B); (value to be proposed by the PL)
- Long-wave net radiation (CG4); (value to be proposed by the PL)
- Duration of sunshine (CIMEL): 0 – 72 seconds.

If the value is outside the acceptable range limit it should be flagged as erroneous.

b) Time consistency check

- **Check on a maximum allowed variability of an one-minute value** (*a step test*): if the current one-minute value differs from the prior one by more than a specific limit (*step*), then the current one-minute value fails the check and it should be flagged as doubtful (suspect). Possible limits of a maximum variability (the absolute value of the difference between the successive values) can be as follows:

Parameter	Limit for suspect	Limit for erroneous
Ground (surface) temperature:	5 °C	10°C
Wind speed (2-minute average)	10 ms ⁻¹	20 ms ⁻¹
Solar radiation (irradiance) (CM11B):	800 Wm ⁻²	1000 Wm ⁻²
Surface albedo (CM14B)	(value to be proposed by the PL)	
Long-wave net radiation (CG4)	(value to be proposed by the PL)	

- Check on a minimum required variability of one-minute values during a certain period (*a persistence test*), once the measurement of the parameter has been done for at least 60 minutes. If the one-minute values do not vary over the past at least 60 minutes by more than the specified limit (*a threshold value*) then the current one-minute value fails the check. Possible limits of minimum required variability can be as follows:
 - Ground (surface) temperature: 0.1°C over the past 60 minutes;
 - Wind direction: 10 degrees over the past 60 minutes;
 - Wind speed: 0.5 ms⁻¹ over the past 60 minutes;
 - Global solar radiation (CM11B); (value to be proposed by the PL)
 - Surface albedo (CM14B); (value to be proposed by the PL)
 - Long-wave net radiation (CG4); (value to be proposed by the PL)

If the value fails the time consistency checks it should be flagged as doubtful (suspect).

c) Internal consistency check

The following conditions shall be true:

- wind speed = 00 and wind direction = 00;
- wind speed ≠ 00 and wind direction ≠ 00;
- wind gust (speed) ≥ wind speed;
- both elements are suspect* if sunshine duration > 0 and solar radiation = 0;
- both elements are suspect* if solar radiation > 500 Wm⁻² and sunshine duration = 0;

If the value fails the internal consistency checks it should be flagged as inconsistent.

Near-real-time monitoring will be implemented and can consist of several procedures, e.g.:

- missing data analysis;
- time-series plots of all measured parameters on a daily (24-hour) basis;
- detection of potential anomalies (extreme values of differences);
- error data analysis.

The software provided by Meteo-France allows such monitoring.

A monitoring of technical status of all sensors installed will be implemented and relevant information will be recorded as a part of metadata file.

Time schedule of the WMO Combined Intercomparison in Ghardaïa, Algeria, 2006 – 2008

Annex IX

Year	2006												2007												2008												09	
Month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2
Agreement with the host country	x																																					
Letter of Invitation		x																																				
Preparation of the Test Plan			x																																			
Selection of the potential participants					x																																	
Questionnaire II to the selected participants					x																																	
Selection and procurement of the acquisition system						x	x	x	x	x	x	x																										
Training for installation/set-up of the acquisition system									x																													
Site preparation							x	x																														
First acquisitions of various sensors/screens available on site, for testing the acquisition and QC procedures														x	x	x	x	x																				
Meteo-France expertise on site for acquisition											x																											
Inspection of the test site and meeting of the ET/IOC in Ghardaïa															x																							
Delivery of the instruments to the Laboratory of Meteo-France													x	x	x																							
Pre-intercomparison calibration of the instruments													x	x	x	x																						
Delivery of screens and instruments to the test site and installations															x	x	x	x																				
Pre-test of instruments, Acq. Sys. and QC procedures.																	x	x																				
Beginning of the intercomparison																			x																			
The intercomparison period (12 months)																			x	x	x	x	x	x	x	x	x	x	x	x								
End of the intercomparison																																x						
De-installation of the instruments and screens																																x						
Delivery of the instruments to the Laboratory of Meteo Fr																																x	x					
Post-intercomparison calibration of the instruments																																	x	x				
Shipment of the instruments back to manufactures																																	x		x			
Preliminary report																																				x		
Meeting of the ET/IOC ¹																				x																x		
Final Report																																						x

¹ By telephone conference organized from Geneva on 30/07, 31/07 or 01/08 15:00 hours.
By meeting in November 2008. Location to be decided.

